THE CARTOGRAPHIC APPLICATION OF ERTS/RBV IMAGERY IN POLAR REGIONS

William R. MacDonald
U. S. Geological Survey
Washington, D. C. 20244

1 July 1973

Type II Progress Report for Period 1 January 1973 - 30 June 1973

Prepared for:

Goddard Space Flight Center
Greenbelt, Maryland 20771

Publication authorized by the Director, U. S. Geological Survey

Type II Progress Report

ERTS-A

a. Title: The Cartographic Application of ERTS/RBV Imagery in Polar Regions

ERTS-A Proposal No.: SR 149

b. GSFC ID No. of P.I.: IN 391

c. Statement and explanation of any problems that are impeding the progress of the investigations:

No imagery is being received over the Antarctic region because the second ERTS onboard tape recorder was turned off in April. Imagery containing a higher percentage (50%) cloud cover suitable for cartographic compilations is being researched in an effort to satisfy the complete geographic areas of each antarctic experiment. Imagery continues to be obtained over the arctic.

d. Discussion of the accomplishments during the reporting period and those planned for the next reporting period.

Indices have been prepared on a polar stereographic projection at 1:10,000,000 scale, depicting the total MSS imagery obtained through May 15, 1973 for the arctic region and March 4, 1973 for the antarctic region (60° latitude to the Pole). All indices are prepared for each 18 day cycle. The 18 day cycle composite indices do not reflect the precentage of cloud cover. Separate indices, however, do reflect cloud cover percentage of 0-10, 11-20, 21-30, 31-40, and 41-50.

Review, selection, and indexing of the selected images continues for the Fairbanks, Alaska 1:1,000,000 photoimage mosaic (Experiment No. 7) and the physical map of the arctic at 1:5,000,000-scale (Experiment No. 6).

A number of Antarctic images were used for mosaics for the following areas: the Victoria Land Coast between Cape Adare and Harbord Glacier, Thwaites Glacier Tongue, portions of the USGS IMW sheet, ST 57-60, McMurdo Sound Region, and Australian IMW, SS 40-42, Lambert Glacier Area.

Compilation will begin on the Fairbanks, Alaska 1:1,000,000-scale mosaic, (Experiment No. 7). The physical map of the Arctic, (Experiment No. 6) will be compiled by quadrants beginning with the SW quadrant. Plans are to update the McMurdo IMW manuscript using ERTS imagery.

e. Discussion of significant scientific results and their relationship to practical applications or operational problems including estimates of the cost benefits of any significant results.

Results of SR-149 experiments demonstrated the feasibility of revising coastlines on maps of Antarctica, detected gross changes in the northern limits of the three largest ice shelves in the world, and led to the discovery of unmapped geographical features in Antarctica. Analyses of MSS imagery during the investigations show positive identification and obvious changes in size, shape, and position of such features as glaciers, ice tongues, ice shelves, and fast ice when compared to the existing USGS 1:250,000-scale maps.

Investigations also pointed out that accurate and meaningful photoimage mosaics can be compiled at scales of 1:500,000 and 1:1,000,000 over the Polar Regions.

With respect to the Antarctic region, many thousands of square miles can be image mapped for the very first time if cloud-free imagery becomes available and at a great reduction in cost of compilation. The international scientific community will benefit from such timely products. Current maps are a necessity for proper planning for field operations, especially over the treacherous terrain of the antarctic.

f. A listing of published articles, and/or papers, preprints, in-house reports, abstracts of talks, that were released during the reporting period:

Abstract and Paper "The Cartographic and Scientific Applications of ERTS-1 Imagery in Polar Regions."

g. Recommendation concerning practical changes in operations, additional investigative effort, correlation of effort and/or results as related to a maximum utilization of the ERTS system: N/A

h. Listing by date of any changed Data Request forms submitted to Goddard Space Flight Center/NDF during the reporting period: N/A

i. ERTS Image Descriptor forms: N/A

j. Status of Data Collection Platforms (if Applicable): N/A

and small-scale imagery mosaic of Antarctica.

Imagery continues to be received over the arctic region. Efforts are being directed toward the compilation of the 1:1,000,000-scale IMW of Fairbanks, Alaska (Experiment No. 7) and the 1:5,000,000-scale physical map of the Arctic, (Experiment No. 6).

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.

4. Title and Subtitle	5. Report Date
THE CARTOGRAPHIC APPLICATION OF ERTS/RBV IMAGERY IN POLAR REGIONS (SR 149)	1 July 1973
	6. Performing Organization Code
7. Author(s) William R. MacDonald (IN391)	8. Performing Organization Report No.
9. Performing Organization Name and Address	10. Work Unit No.
U. S. Geological Survey Washington, D. C. 20244	11. Contract or Grant No. S-70243-AG-2
12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Mr. Frederick Gordon, Jr. Goddard Space Flight Center Greenbelt, Maryland 20771	Type II Progress Rpt. 1 Jan. 73 - 30 June 73
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

The 1:10,000,000-scale indices have been prepared for both polar regions (60° latitude to the Pole). These indices depict the total MSS imagery obtained through May 15, 1973, for the Arctic region and March 4, 1973 for the Antarctic region, but of course does not depict imagery between 82° latitude and the Pole which is the area of the earth for which ERTS cannot provide coverage. The indices are prepared as a composite for each 18 day cycle and as separate sheets within the 18 day cycle reflecting cloud cover percentages.

The second ERTS onboard tape recorder became inoperable and was turned off in April. This prevents further collection of imagery over the Antarctic region.

Analysis of the imagery received over Antarctica resulted in the detection of unmapped geographical features, changes to coastlines depicted on existing maps, numerous changes to the size, shape and movement of glacier and changes in the northern limits of the three largest ice shelves in the world. The results of the investigations clearly demonstrates the feasibility of revising coastlines on maps and the compilation of medium

17. Key Words (Selected by Author(s))	18. Distribution Statement

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Not Applicable	5	Leave Blank

*For sale by the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

Figure 2. Technical Report Standard Title Page